





CHEMISTRY AND PHYSIOLOGY

IN THEIR

RELIGIOUS BEARINGS.

A LECTURE

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THIS Lecture, originally intended as the Introduction to a General Course of Chemistry, for the late Professor Fleming's Class, in the New College, Edinburgh, and which, slightly altered, has been on several occasions delivered in Public, is now published by the request of Friends.

The writer does not claim any ideas herein set forth as *new*. His desire was, and is, to give prominence to some interesting subjects neither purely speculative nor metaphysical, but yet somewhat different from the ordinary matters on which the mind reflects.

Faith, or the expression of a satisfied condition of mind, with regard to certain undemonstrable truths, is the psychical analogue of the term nutrition, employed as the chief functional exponent of somatic life. And whilst in common with not a few, the writer feels that on many of the attempts to reconcile Science and Revelation,

“ Nullos habitura triumphos ”

may be fairly inscribed, he cannot forget that where we may not anticipate a solution of the difficulty, we have still this assurance to fall back upon, “ My grace is

sufficient for thee ; my strength is made perfect in thy weakness."

A principal object of this Lecture also was to direct attention to Chemistry and Physiology as important aids and assistants to a religious and liberal education. Its extension beyond academic walls, is no reason for withdrawing these opinions. On the contrary, the writer is glad of this opportunity for giving them greater publicity.

On some of the subjects alluded to, opinions are held by many, different from those which are here expressed. The religious views of pious men on certain matters of detail, where a considerable latitude of opinion is admissible, are, however, not to be sneered at because they may seem scarcely susceptible of argumentative proof. The writer believes that he cannot be fairly accused of irreverently disturbing the *silence of Scripture*, whose significance Canon Miller has recently so well portrayed. He trusts, also, that without presumption he may, in that train of thought which he has followed with reference to a *resurrection* and our *future identity*, claim sympathy with the author of "Life in a Risen Saviour," a book which he has had the satisfaction of perusing since this lecture was put in type.

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FROM the deathlike zero of Atheistic Materialism, to the thick, misty and unwholesome heats of Nature Deified—from Atheism to Pantheism—infidelity is developed in a hundred different ways. Under such varied features, indeed, does the principle present itself, that, chameleon-like, there is for each human heart a special conciliatory colour, with which its advance may be disguised. Or it may be, more openly, there is offered to the enthusiastic and impassioned worshipper of Nature some alluring image with which to occupy the throne of the Eternal in the soul.

Thus, though he wars not against flesh and blood, the Christian's battle-field is a wide one. Corruptions without and corruptions within; great apostacies, and personal shortcomings; open scepticism, and secret doubts; these and such as these are the constant and daily enemies of his peace. Herein, however, lies the analogy between one of the great features of his life, as a son of Adam, and as a child of grace. Throughout the former he is doomed to incessant labour and toil, for that bread which perisheth; whilst, as respects the latter, he is no less surely warned, that only through great tribulation shall he enter into the kingdom of God.

Now, the moralist sees in both arrangements indications of beneficent design.

"Were all the year one constant sunshine, wee
 Should have no showres;
 All would be drought and leanness; not a tree
 Would make us bowres.
 Beauty consists in colours; and that's best
 Which is not fixt, but flies and flowes.
 The settled *red* is dull, and *whites* that rest
 Something of sickness would disclose."

Difficulties are our true excitants to exertion; the goads by which, ever from unseen hands, are given those friendly thrusts that stimulate to physical and mental exercise. It is, indeed, a glorious thought, that from all evil God bringeth good; from sorrow joy; yea, even from destruction and apparent death, reorganisation and life. Agreeably to this same principle, then, we find that our intelligent approaches to the unseen and Beneficent One, are, as it were, strengthened by many philosophical aids and assistants, which this very siege-like condition to which the prevalence of infidelity has reduced us has naturally called forth. And of all that is ours on earth there is perhaps nothing, save our hallowed loves and affections, which the naked soul, sin-cleansed, shall carry with it from the death-couch to the upper world but the pious philosophy of its youth. For, to conceive that the goodly teachings of earth-learned science are not worthy of the spirit in its after life, is as foolish and vain as to compare the greatest amount of knowledge here acquired, to more than the first blush which, at earliest dawn, precedes the rising of the god of day.

Certainly, one class of spiritual difficulties which men encounter is very much regulated by their own individual temperament, and by the spirit of the age in which they live. One man may know nothing of, and indeed may be incapable of appreciating that difficulty which disturbs to the very utmost the soul of his friend. And Christian teachers should be especially careful not to stigmatise as heretical that condition of mind in which doubts and anxieties are but the indices of a disposition too precise and exacting to be silenced by any dogmatism, when the proof seems incomplete. For the soul,

when in the healthy exercise of its functions, is too much in real earnest to receive, as part of a system by which its earthly career is to be guided and its faith upheld, any so-called fact the reality of which it feels that a death-bed criticism might unsettle.

The soul has its own battles to fight. For "Reason and Faith," the active agents of an enlightened obedience, of a worship alike most pleasing to God and most worthy of man, operate, as Mr. Rogers has so well expressed it, by a system of alternate checks and limitations. It was never intended that ours should be that "passive faith which mimics the possession of absolute certainty itself.—Man cannot be nursed and dandled into the manhood of his nature, by that unthinking faith, which leaves no doubts to be felt and no objections to be weighed." Neither is this condition of "reasonable service" at all opposed to that of humility and subjection to a heavenly Father's will. And therefore it is, that we should not omit narrowly to watch over two of the chief inciting emotions which control impulsively so much of our general conduct. I mean, hope and fear. For "pleasure and pain array themselves at once against any science that seems to contradict Scripture. There is fatigue in proving how much we can justly believe; despair in abandoning our present belief." This is what the author of "Faith and Reason" so well describes as "a guilty liability to self-deception." Doubtless, it is what you all have felt, and against it we should resolutely strive. Perhaps it is more from the seeking than from the finding of truth, that man's mental *vis inertiae* recoils. But nothing can in any way remove or lighten his responsibility in this respect, save that obliquity or aberration of intellect which, when the Almighty has permitted it to fall on certain minds, we are assured He will mercifully judge. Nor is there, on the other hand, any reason why we should indulge in an unfavorable prognosis of the result of our labours. Science, be it remembered, has at least done as

much to dispel as to raise doubts. And, though with the removal of present difficulties, new ones may in the progress of discovery and in the incomplete state of our knowledge be expected to arise; yet divine truth must be ultimately triumphant. So long as mysteries remain unexplained, they should be regarded as ordained for "the exercise of that faith, which is perhaps nearly equal in every age and necessary in all ages, if we would be made *little children*, qualified to enter into the Kingdom of God."

There is no doubt, that what may at present be classed amongst the most important religious difficulties, those which intrude themselves in a manner upon us without our seeking, are, in accordance with the spirit of the times, of a philosophical class. And the grand problem has become, how to reconcile Science and Revelation. For the chasm *must* be bridged over, and the difficulties be removed! Thus, as it seems to me, the silence of Scripture has been disturbed. Theories have been offered inadequate to the task assigned them, and though ardently hoped for, a reconciliation has not been achieved.

My own opinion I give unhesitatingly—it is satisfactory at least to myself—that he who states as a proposition, that science cannot contradict revelation, states the truth. To my faith that statement is as clear as day. It comes upon me with the same inspiration that tells me of the necessary existence of a God, and that that God is beneficent and just.

"A secret awe doth through my bosom steal
Of the all present God.—Gently my heart
Heaves up within me, and I feel,—I feel
Thou too art here, here where I weep Thon art."

But to my intellectual faculties, the reconciliation between the two in all matters of detail has never been clearly demonstrated: nor do I suppose that in this world it ever will; and further, I am in no way disturbed by such a thought. I regard the future—that future from which the grave separates us individually—as the period when all the dark glasses being broken

through which man now contemplates the Eternal, and all the material obstacles being taken out of the way, to the full developement of his intelligenec, man shall—when faith is lost in fruition—in his glorified nature, in his spiritual body, acknowledge with grateful earnestness, that full and perfect harmony, which he cannot distinguish here. Nor should we be forgetful of that promise: “Blessed are ye *who have not seen, and yet have believed.*”

I shall not here attempt to particualarize any of the points where Science, under the terms Geology, Ethnology, Philology, or other designations, seems opposed to divine inspiration. It is assumed that you are all aware of the fact that a great controversy is going on regarding this subject. On one side open sceptics, on the other Bible adherents are arrayed. And, as from time to time new facts are brought to light on either side, so does the subject periodically, as it were, receive fresh impetus and acquire wider publicity. Now, it is stating simply the truth to aver, that on the side opposed to Revelation talent has too often linked itself with the most degrading sophistry; and that the venom of hatred to God as a personal reality, and to His religion as a binding rule of life, has come out so strongly as to stamp their opposition with the character of anything but philosophical fairness. Nor does it admit of doubt that there are thousands who cheerfully receive the dicta of science, though apparently opposed to the evidence of their senses, (the fact that the earth moves round the sun, and not the sun round the earth, for example,) and that they do this by that very faith which they refuse to exercise in matters of infinitely greater importance to themselves. The conclusion is obvious that *the will* has to do with much of our modern scepticism. “Nor do we well know,” says the author already quoted, “what multitudes who neglect religion on account of the alleged uncertainty of its evidence could reply if God were to say to them, “And yet on *such* evidence, and that far inferior in degree, you have never hesitated to *act*, when your temporal interests were concerned. Why were you so much more scrupulous in relation to ME?”

My practical advice to a young and ardent mind, about seriously to commence the study of science, is this,—settle first of all what God requires you to believe. A few great principles set piously aside will not in any way cramp your philosophical aspirations, will certainly not diminish your perception of the beauties of Nature, and will moreover serve, amidst the confusions of an imperfect instrument and a clouded atmosphere, to keep your future home distinctly in your view.

I do not propose to occupy your attention with the question of a reconciliation between Science and Revelation, as a subject in dispute. In believing that what we know not now we shall know hereafter, the general question becomes reduced to one of time and place. For to disallow the possibility of fully developed Science contradicting Revelation is nothing more than to reject as absurd and illogical the suggestion, that He, whose predicate is truth, can ever lie. For my own part, I prefer to find, in the comparatively speaking unimportant blanks which just criticism discloses between the Cosmical and the Inspired records, rather matter on which to exercise my faith, than with which to distress my mind. And most assuredly do I find nothing, however powerfully urged in argument, from those present discrepancies, to shake that confidence in God, without which eternity becomes a blank, heaven a delusion, and the soul, with all its higher loves, desires and sympathies, shrinks into very nothingness, as its promised home is severed from its view.

I cannot however avoid remarking that at the present time there is, perhaps, too much inclination to bring science and religion into contact. They are often ostentatiously and injudiciously paraded side by side, as the kindred voices of the same Creative Spirit; and this not unfrequently by men who, whilst they are competent on one side, are not fully equipped on the other. There is, believe me, no book with which we have more need of a warranty, than a “religious scientific” one; and there are few literary contributions of this class, how-

ever valuable, which have escaped the keen but just criticism of those who seek truth fearlessly and who cultivate science on its own broad and independent foundation.

But whilst honesty and circumspection are indispensable in appreciating the fair value of science as an aid and auxiliary to Scripture, as well as in using it controversially for the refutation of sophistry and a false philosophy, there is no doubt, that in this age no man should be educationally deficient in the foundation, at least, of that knowledge which may, as we know, be so powerfully wielded on either side. And what I propose as the object of this lecture, is to show how naturally, as it were, two of the most important branches of physical science bear upon certain religious points; how, in fact, Chemistry and Physiology help to illustrate and explain certain Bible statements; and how harmoniously, in some particulars, the book of nature, so far as these sciences are her interpreters, may be collated with the written message which God has given in His Word.

And first, I would remark that there are no departments of physics from which natural theology may so largely draw, as from these two sciences. I do not think, indeed, that Chemistry has ever occupied its proper position in the great argument. And this, not so much from any want of able chemical advocates on the side of orthodox theology, as from that difficulty which attends the intelligent appreciation of its more advanced indications, without the previous study of its simpler facts. Hence becomes obvious the importance of a systematic training in the general laws of this noble science, whose operation we observe in every department of nature, and the stability of whose phenomena is the foundation of all the wealth and plenty with which the arts and manufactures of our country surround us. If, indeed, any authority was required for the accuracy of such a statement as the following, we have it from the pen of Isaac Taylor, that "in several instances the indirect effects of a course of study are of more importance than any direct benefits which it may seem to hold forth as the ends or reasons why it should be prosecuted." And unquestionably, as regards

the study of Chemistry, it may be said, that it tends in an especial manner to develop "one of the fundamental means of obtaining and using knowledge, so few in number, which together constitute the general power of the human mind." Whilst, as respects its own position as a science, it is not only in itself one of the most useful, but also one of the most central and comprehensive. For it attaches itself to and passes, as it were, imperceptibly into so many of the other sciences, with which it holds, so to speak, a phenomenal relationship. It is in the study of such connections that we discover direct evidence of the mutual convertibility of the forces of matter, *e.g.* of heat into light; of heat into motion; of chemical action or force into electrical force, and *vice versa*; and of light into chemical force; facts which point with all the silent, but expressive energy of nature to the existence of one central force; and thence to one central law, underlying as it were these so-called agents. In a lecture on the harmony of Scripture and Philosophy, by the Rev. J. Forbes (1833), I find this sentence: "From the loftiest star to which science has winged her flight, or the deepest laboratory of nature into whose recesses she has ever penetrated, has she brought back accumulated demonstrations to the doctrine, that there is only one God. Everywhere she finds herself within an empire which, by the uniformity of its laws, the identity of its institutions and the symmetry and consistence of its administration, proves this truth." Now, as a chemist, I may demand your admission to the existence of more than that harmonious circuit of co-existing regularities to which the mere physicist points. For the term *connected* I invite you to substitute *identical*; and instead of regarding Nature as a machine, harmonious as a whole, and only on that account affording evidence that in all its parts it is the work of one and the same Artificer, I would have your attention directed to that *essential unity* to which the mutual convertibility of the forces of matter points, as affording an evidence of the existence of *one* great Artificer, which no recognition of the *mere harmonies* of nature could ever equal.

Or, viewing the bearings of chemistry on natural theology from another quarter, which, in the language of the former, I may term the analytical; take, as an example, a mountain; one of those impressive natural objects which can excite in the soul emotion, can arouse within us the consciousness of the sublime or of the beautiful, till by an incorporating process the very dead matter itself seems to contain that which it has only stimulated and aroused. And yet it must be allowed that the grandest and the loftiest mountain in nature, even though its sides may be beautified by vegetation and its summit covered with perpetual snow, whilst on its face is boldly written the record of some early disturbance, of an upheaval or a flood, does not present to the mind the idea of an ever present ever active God, with the same intensity of expression, as when we regard that mountain as but a congeries of chemical bodies, of atoms replete with activity and power, of countless centres of force, now heaped together in repose, but capable of expansion, and, under a new arrangement, of forming on the instant air and water, plant and animal. Is not the mountain like the still heap of browned earth and straws, which the woodland traveller dislodges that he may wonder at its busy myriads of insect life? Or, again, I might ask you, what commentary on these words, "in whom we live, and move, and have our being," can equal that which physiological chemistry offers, in her history of the changes effected during respiration and nutrition, during the exercise of the voluntary organs, or the mysterious operations of mind. Each corporeal effort has its equivalent in new chemical products, resulting from the expended tissues which produce it; yea, and each thought has its material counterpart in some new modification which a portion of the organ through which it is propagated undergoes.

The fact is simply this; our bodies—the bodies of animals generally—are just so many engines, where the food is the fuel which with the oxygen of the air produces the necessary heat. In us, the life-tide flows and ebbs through a compli-

ated system of delicate elastic vessels, whilst in the steam-engine the motive current or gaseous water is conveyed by solid and unyielding tubes. Both engines consume carbon; and in both does water form the great plastic medium through whose chemical or physical metamorphoses motion is produced, and both bear the indestructible stamp of creative wisdom. Hours, days, months, nay, years of speaking would not exhaust the evidences of prescient design. At every turn, we find matter arranging itself according to some principle, in which may be detected a provision for every possible contingency, and a significant relationship, which even fixed numbers can be found to express. So that, where there is perpetual change, there is also ceaseless harmony; and where all is moving, there is yet stability and repose.

It is true, then, that on the doctrine of the fortuitous concourse of atoms there has been cast the annihilating stigma of absurdity. A notion unphilosophical and barbarous, the blight of each pure emotion, and extinguisher of man's nobility; universal nature tramples on it, and scorns the degrading epithet of a child of chance. Go, Atheist, and find a transparent and colourless crystal; and, fresh from the concealment of its rocky matrix, lay it in the full light of heaven. See how the colours play on its shining facets. It has decomposed a sunbeam! Yet light and it were strangers until now. For, at the rate of 200,000 miles per second, that light has journeyed $94\frac{1}{2}$ millions of miles, fresh from that mysterious orb, which is to us the great physical source of heat and light and life. He who arranged the composition of the solar ray did likewise adjust, and at such a vast interval of space, the internal molecular arrangement, or elasticity of the atoms of denser terrestrial matter, so that, when in darkness shaping themselves into geometric beauty, they might ever claim kindred with distant and more ethereal forms, and thus shame the depravity of higher orders of creation, by their silent testimony to the universality of God.

But passing from the perception of God through His works

to the written revelation which His inspiration has supplied ; it may be objected, that the assistance, if any, to revelation which Chemistry can bring is in no way to be compared, either in kind or in degree, to that which Geology offers ; inasmuch as the first can only meddle occasionally with some isolated statements of Scripture, whilst the second seeks to identify itself with the very foundation of these records.

Now, in the first place, no two sciences are more closely related than Geology and Chemistry. Examine the former in its physical, descriptive, practical or apologetic bearings ; and it must be seen how inadequate are mere physical explanations, without a reference to chemical laws. Modern Geology is now turning its attention to the discovery of the laws of combination and decomposition. And the period is not far distant when chemical knowledge will be held to be, I do not say as useful, but as indispensable to the Geologist, as the compass to the mariner in the guidance of his ship. When, therefore, Chemistry links itself with Mineralogy, and is admitted as the sound analytic foundation of that science, it is only the short-sighted philosopher who does not anticipate its further expansion as a demonstrative Geological basis. As that foundation is laid many of the present physical explanations, " frequently based on untenable hypotheses, will retire more and more into the background," and at length entirely disappear.

In the second place, I cannot refrain from pointing to what I may be permitted to designate as a simple Chemico-Physiological commentary on the Mosaic narrative of creation. It comes forcibly to my mind that the sublime prolegomena of Scripture, contained in the first chapter of Genesis, whilst they lose none of their sublimity, do as certainly lose nothing of their truthful reality, when regarded as expressing, among other things, the establishment of an abiding, a mutually supporting, yea, an intelligible balance between organic and inorganic nature. For whatever mystery hangs over the Mosaic record, and however its epochs are to be understood—its days interpreted—I find the following chronological arrangement

in its details. First, the establishment of the force of light. I do not say its creation, but its arrangement and recognition as a ruling and organising power throughout the firmament. Next, from the solid earth, I find a teeming vegetation springing up, storing up the sun force, and a portion of the atmosphere in its delicate organisms, and at its creation perfected to fulfil its part in the organic arrangement. Lastly, I find recorded the creation of animals, with whose appearance the balance of nature is complete.

Do not fear that in thus collating Scripture with Science, you may be seduced into conceiving the creation by fiat of the Deity to be reducible to any doctrine of the philosophy of man. Creation, as a fact, is not within the domain of reason to explain. But inasmuch as by it the power and beneficence of the Creator are revealed, we are permitted, nay, we are commanded, to study its details. Now let me put the question, how comes it, when nothing was known of the organic relations of air and plant, of plant and animal, of animal and air, and of light and organisation as a whole; how comes it, I say, that Moses, ignorant of the laws which these relations express, if at the same time unassisted by inspiration, should have related matters so far as regards these important particulars just in their proper order? The Bible, we must all allow, was never intended to teach us science; and yet we must admit, that had the Biblical order of detail in the above particulars been other than it is, the establishment of organization would have become a physiological enigma, quite inconsistent with the present conditions of organic life and of inorganic activity.

And in the same spirit, as chemists and physiologists, let us comment for a moment on the 7th verse of the 2d chapter of Genesis: "And the Lord God formed man of the dust of the ground and breathed into his nostrils the breath of life, and man became a living soul." Thus our idea derived from Scripture of man's creation is that his body was first made of the constituents of the soil, and being completed, it was

quickened and vivified by being breathed *into*, through the nostrils, by the Almighty. How does this agree with what we know of the circumstances under which man *now* comes into the world. For, though he was made at first not according to that process of development, by which in ordinary generation he is reproducible; yet there are obvious reasons why no physiological discrepancies should exist. In the child, previous to birth, breathing is impossible. Enveloped in membranes, and surrounded with a watery fluid, the unborn infant is more of an aquatic than of a land animal. In this state it is provided with blood through its mother, in whose system that fluid undergoes the necessary oxygenation. Packed with the head upon the breast, and the knees bent up on the abdomen, the chest, where the lungs are placed, is compressed to the smallest space. It is thus obvious that any change of posture, the straightening of the spine, the raising of the head, and the removal of the thighs from pressing on the abdomen, must elevate the ribs, and allow of the pressure of the internal viscera being removed from the diaphragm. The cavity of the chest is thus enlarged, the elastic air-cells of the lungs are opened up, air rushes in, and the blood, which till then circulated through the infant without passing through the lungs, now flows to their distended vessels, and a double circulation is established. But as man was first made, the conditions for inducing or exciting inspiration were wanting; and therefore the bountiful Father quickened him with his own breath. The resemblance cannot but strike us between that act of the Deity and the expedients to which we ourselves now resort for inducing respiration, when the ordinary conditions are insufficient to produce it at birth; or for resuscitating the bodies of those in whom it has been suspended by some accidental cause.

But, besides the physiological consideration of the subject, there is another point which, as it is inseparable in the narrative, so here also it demands our attention. For not only was vitality thus communicated to man, but with that breath there came also a spirit, $\psi\upsilon\chi\eta$ —pure and resplendent as its

Maker, which no sin had sullied, whose love no 'ferment of the great affections' had as yet disturbed; and thus, in the perfection of moral innocence, no less than in the intensity of intellectual being, Adam stood before his Maker a living soul. I confess to some reluctance in at once relinquishing the contemplation of so sublime a picture as man in his state of moral innocence presents; for there is, in *the beautiful*, something that seeks to draw out—to develop our nature; hence fancy loves to linger where Paradise once was, and even now if, on the winds that blow but roughly, there comes a fragrance, then the chords of other and happier years are in a moment struck.

But we may perhaps find more profitable employment in adverting to the similarity of two Divine acts; the first, as we have seen, originative of life in man; the second, communicative of an union from the Holy One.

Let then the scene be changed—time, place, and individuals altered—for more than 4000 years have winged their flight. The fair face of heaven is replaced by an upper chamber, where love for the crucified is hiding itself. Instead of unquickened clay, we see a company of disciples, who, having followed Jesus of Nazareth whilst living, now mourn dejected at his departure, now quicken into expectation at the message which the Magdalene has brought. And when at length their risen Lord, rejoicing them with his presence, displayed the tokens of his sufferings, and commissioned his followers with the message of *His* peace, then, as if mindful of that act by which the God of Creation quickened the first tenement of clay, the God of Redemption repeats it. It is said, 'he breathed on them'—ἐνεφύσησε—the same word which, in the Greek translation of the Pentateuch, is used to denote the vivifying breath of the Deity—'and said, receive ye the Holy Ghost.'*

* Καὶ ἔπλασεν ὁ Θεὸς τὸν ἄνθρωπον, χοῦν ἀπὸ τῆς γῆς, καὶ ἐνεφύσησεν εἰς τὸ πρόσωπον αὐτοῦ πνοὴν ζωῆς· καὶ ἐγένετο ὁ ἄνθρωπος εἰς ψυχὴν ζῶσαν.—Gen. ii. 7.

But there is another problem with which Scripture and chemical science have to do. The former records the appointment of death as a punishment; encircles dissolution with divine significance; and leaves men to ponder over its momentous realities, as it affects them in their condition of responsible agents to the Deity. The latter anticipates it as a necessary occurrence, according to the present constitution of nature; and even without the "testimony of the rocks," calls upon us to acknowledge, that constituted as it is, nothing could have been, *even in a sinless world*, perpetual. Physiological chemistry declares *death* to be "a general law of organic natures." Nor is this death an opprobrium from which Nature necessarily recoils.

Now, I cannot allow the weight of any argument on this subject, which seeks to regard it as one pertaining purely to faith, and as referable only to Biblical authority, and not equally affected by the facts which reason and observation teach. Least of all, have I any sympathy with the illogical reasoning and complicated demands of those, who, giving the grand and comprehensive balance of nature the go-by, assert a special perpetuity for the life of man, (had he remained in innocence,) which they dare not, with the dead millions of a pre-Adamite earth, affirm that the other creatures of God would have enjoyed. The pious and earnest Hitechock wisely remarks, that the command given to multiply and be fruitful, implies a cause for this increase. I must not, however, be construed into asserting, that God could not have made man, remaining sinless, immortal; for no miracle is beyond his sovereign power, and we, moreover, know that immortality awaits us hereafter. But, to escape from a system of universal death as a counterpart to reproduction is to shelter under the miraculous, and to imagine a miracle without proof, merely to escape a fair conclusion, is, as the same excellent writer observes, "very wretched logic."

To simplify the argument, the terms in use must first be defined. What is death? As a *generic* term, it means one thing, as a *specific* term another. From the Bible and from the

pulpit; from the sick-bed and from the sepulchral stone; there comes a meaning with that word, which may well awe the stoutest heart. Death as there spoken of is the wages of sin. But as a physiological occurrence, it must be regarded in quite another light. It is then a specific act, *in which the body only is concerned*. Death, or *somatic death*, as I shall continue to call it, simply means a dissolution of the organism; and a complete change in the arrangement of the particles of which it was composed. Death has nothing necessarily to do with a separation of soul and body. It is essentially a material act. And whilst the physiologist admits the common accompaniment of pain, he regards it as an accidental accessory, not as necessary or unavoidable.

So far, indeed, as the moribund are concerned, we cannot deny that there is on the part of nature a tendency, as it were, shown towards the mitigation of suffering, "by tenderly bearing her children from one world into another, when they are already heavy with sleep, for in the hour before the last, she allows a breastplate of indifference towards the survivors to freeze around the heart of the lamented one. And in the hour immediately preceding dissolution, (as we learn from those who have recovered from apparent death, and from the demeanour of many dying persons,) the brain is as it were inundated and watered by faint eddies of bliss." Even as it is, then, death, in all its generic significance, may be comparatively painless. And assuredly it is deprived of the most formidable of its terrors, when it comes to the "good and faithful servant of the Lord." I have no doubt that others can corroborate what I certainly can affirm, that to the savage death does not present the same terrible aspect as to the civilised. It was my lot once to witness the exit from this world of nearly a hundred negroes from the Zambesi, in not much more than a month. Their death was as painful and distressing as external circumstances could make it. In no one instance, among the whole number of sufferers, could I discover the slightest indications of terror or dismay.

Jeremy Taylor, with a freedom from prejudice and a sagacity which is the more creditable, since Geology was not in his day a science, gave it as his opinion that "the death which God threatened to Adam, and which passed on his posterity, is not the going out of the world, but the manner of going." This opinion has received the more recent sanction and support of Dr. Chalmers, and other able commentators and theologians.

Now, I wish you clearly to comprehend that *somatic* death is the result of the cessation of the *individualising* tendency in the different particles of the body, be it of a mushroom or a monarch. For somatic life is developed in a constant succession of chemical changes, so regulated as to the nature of the products which they yield, and the rapidity of their action, that under the term *nutrition*, a balanced process of waste and repair is established. This balance is, so to speak, the result of the organizing force; or, more logically—for we do not admit the existence of any so-called vital agent—it is the result of an organic law, which establishes, that under certain conditions of which we are ignorant, some fifteen elements, or a certain number of these, shall during a given period have their forces and affinities so directed, as to form an animal or a plant. Nor can it be objected to such a phenomenal definition of *life*, that it leaves us completely in ignorance as to its real nature—*sensu imminente*. Of him who would account for life by any other means than a direct reference to the Deity, it may, as Coleridge says, "be demanded that he make it, as Euclid makes his figures, from a knowledge of the laws of their construction." All we know, or profess to know about it is, that functionally it lies between two antagonistic principles; that its most constant phenomenon is expressed as nutrition, or the balance of waste and repair. And, further, we know that animals feed upon plants,—and that plants feed on the elements derived from the air, and from the soil,—to which air and soil animals afterwards restore what they have taken from plants.

Thus the somatic death of an animal, is simply a restorative act in the great scheme of organic nature. It belongs to the same category as diffusion among gases, or any other general law, by which accumulations are prevented and beauty and freshness is secured. And leaving out of view as useless and unanswerable, the question how long an organised body could have been made to last—we know that at an early period man attained a surprising age—what the physiologist claims in the original system of nature is, that decay and reproduction must have stood, just as we see them now stand, in a fixed ratio to each other.

Not only, however, on the ground of stricter argument, may I press this subject on your attention and belief; but I would beg you to admit this analogical proof also; that just as by sin came, not a change in the process by which we are born into the world, but that curse on the maternal act, which renders what might have been painless now so agonizing and severe; so has our exit become, not a mere sleep or peaceful change, but the dread moment of retribution for inherited and accumulated guilt. The fear of death, the sting of death, the judgment, and the retribution, these came upon our first parents at the Fall. The physiologist who is a believer admits these sad realities; but he does not on that account the less clearly demand the pre-existence of a "*somatic death*," an epoch of organic dissolution, for every individual member of the organic world.

As you well know, there are other examples in Scripture, where special significance has been impressed by God, upon certain pre-existing and otherwise ordinary phenomena. Take, for example, the curse on the deceiving serpent. Faith here wisely submits to Reason, who tells her that beyond all doubt, the Ophidian's epidermal covering, assisted by its numerous vertebræ, was its natural apparatus of motion, and that it glided snake-like as now before the mandate—"On thy belly shalt thou go"—had gone forth. The anatomical fact is not in the least opposed to the *significance* of the divine decree; and Reason on

her part submits to Revelation, accepting the announcement in humility and faith.

So also with the rainbow ; originally impressed with no more import than the cloud on which it rests. As is well known, it is usually produced during rain, or towards the end of a shower. Sometimes it is formed along the ground, on the dew-drops, a little after sunrise ; on the sea-foam, or on the spray of fountains and cascades. In every case it consists of a series of successive zones, or bands coloured like prismatic spectra. The conditions which produce it now and since the flood, were in full operation before that catastrophe ; and to the ante-Noahians, as to us, the painted arch stood forth on the watery sky. But it was selected by God as the prominent and standing memorial, that not again will this terraqueous globe be submerged by the overflow of its watery elements. And thus no longer the index only of certain meteorological conditions, it is the seal of a promise, the memento of a punishment which is past and of mercy for the future. And thus shall it ever stand to the believing philosopher, so long as the sun and the rain-cloud of this world endure. Lastly, as regards the present universality of the law of death, be it remembered, that " In the resurrection, men neither marry nor are given in marriage." Here at once is the removal of the great physiological obstacle to the perpetuity of individual life. Procreation by the ordinary course of generation ceases in an after state ; not because it is sinful in act, or defective in character ; but because it stands forth on the page of man's human history, as the mundane badge of his decaying nature.

In conclusion, I would remind you, that with this our favoured science, we are not only prepared to take cognizance of the phenomena of life, with its many changes and mutations ; or to study death in its new character of the restorer of beauty, and the friend of nature ; but we may even find assistance from Chemistry, in examining the particulars of that faithful message, which promises to man a resurrection and immortality. Some profess to find in the chrysalis and butterfly

the natural analogue of what they anticipate. With such I cannot agree. How beautiful, on the other hand, is that emblem of man's recal from sleep and dissolution, which the philosophic Paul presents in the well-known 15th chapter of Corinthians. The fact is, that to the chemist "*resurgam*" is for ever sounding through nature; at once the knell of a departure, and the expression of indestructibility and life. What is it that makes the grain of wheat vegetate? We call it the "*organizing force*," the first effort of which is directed towards the change of the elements of the seed into new forms. This is its death—it is all that is demanded as the conditions of that act—for, reduced to its simplest terms, somatic death is only a change in the arrangement of particles. In that death which is reproductive of a cereal crop, the chemical changes in the seed are chiefly confined to the conversion of starch into sugar. Whilst in another, and so far as the immediate results are concerned an unproductive death, the starch becomes carbonic acid, and the nitrogen ammonia, both of which escape into the air. In the former, the individual-organising force in the seed is supreme over the modified materials, and, as a result, the corn plant waves its head in the light of day. Whilst in the other, the products of the change or death of the seed are not such as the individualising, corn-producing force can control. They therefore pass into the storehouse of nature, to be appropriated by organisms different from that from which they were evolved. This is the history of the seed, of its change or death, and its reproduction. And on the whole, this fact is plainly marked, *that which is sown is not that which is reproduced!* Sugar is not starch, though it may be produced from it. Nor is the vegetable fibre of the stem, the same as the sugar from which it was certainly formed. But here comes a difficulty. Reason is at fault; and only by Faith do we accept as a fact, the resurrection which awaits ourselves. For the chain of physiological reasoning is utterly incomplete. In the first place, the period for the continuance of the somatic death of animals, differs from

that of the reproductive change in the vegetable seed. To all animals, except man, death is believed, (except by the wildest visionary,) to be eternal. That is, once dead, the lower animals live not again. Their identity ceases at death for ever. The matter of their bodies is dissipated in the earth and the air, and "their names perish." With man's body the same conditions of complete dispersion are active. Open the grave at successive periods, and you find less and less of what was once a human body, till finally the upturned sod reveals not a trace of what was formerly so noble and highly organised. Man's body knows no renovating change immediate on the cessation of his previous existence. No germ-like reproductiveness is his; no embryotic expansiveness, that can, seed-like, awaken from his altering particles a renovated body like his former self. His tissues are resolved into air, his ashes are scattered to the winds; and yet—as surely as his Redeemer rose—so shall he rise also. I think it is well that you should not fail to comprehend how far the simile of St. Paul is to be interpreted by the light of reason, and how far the doctrine of the resurrection is to be received by faith. Physiology, be it remembered, denies the existence of any so called germinal essence, or central point in which the identity of the organism, be it of plant or animal, resides. The seed is not a *germinal point*, but the collection within a husk or capsule of as many of the material conditions, (whatever these may be,) of reproduction, as are required for completing, with the aid of external matter and external stimuli, such as light, heat, and moisture, the vegetative process; and the same is true of the animal ovum. There is nothing therefore more untenable than the idea, that some secret germ lies hidden from decay; around which, when the last trumpet sounds, the components of its former self shall reassemble and be reunited. The resurrection of man is a profound, an inscrutable mystery. Attempt to force the parallel of the Apostolic simile too far, and the veriest tyro in natural science will smile at your delusion. The facts, however, which expose a want of continuous physiological parallelism between the reproductiveness of the seed and the resur-

rection of the body, cannot be justly taken to express an imperfection in the simile adopted by Paul, nor be legitimately used to oppose the doctrine which he inculcates. If animals grew from seeds, as plants do, it is quite clear that there would be no mystery in the matter! A somatic resurrection would then be a part of the scheme of organic nature. It would just come in the common course of things, and as an ordinary event would be participated in by *all grades of the animal creation*; the period of germination, of course, following such laws as to time and other conditions as the Creator might have seen fit to ordain. Now, not being natural but miraculous, it extends no farther than God ordains—it is not a general law of nature—it is the result of the Saviour's resurrection, and the consequence of his mastery over death. There physiology safely leaves it. "I know that my Redeemer liveth,"—the miracle of his resurrection is an established fact—and knowing this, I believe that "though after my skin worms destroy this body, yet in my flesh shall I see God," *I myself, and not another*, as the passage emphatically expresses. The simile of St. Paul just extends to this, that as the particles of the seed were obviously changed in the ground, and were nevertheless *naturally* reproducible in all the symmetry and beauty of the organism from which they were derived; so our dead bodies, buried seed-like in the grave and there decomposing, shall be raised up in incorruption, the glorified repetitions of our former selves; not however in accordance with any *necessary organic law*, but by the miraculous power of the second Adam, who is the "quickening spirit."

Hitchcock, who maintains that the resurrection body springs directly from that which is deposited in the grave, is forced to adopt the hypotheses of an "attenuated essence," not affected by mechanical or chemical action; and suggests that we can thus conceive the germ of a spiritual body being attached to, and following through all its wanderings, the sleeping dust. To the believers in the existence of odyle, amongst whom I

do not class myself, and to those whose minds are satisfied with the accuracy of the observations which have been made on this subject, such a theory may be sufficiently acceptable. But even if, for the sake of argument, we admit the reality of the odylie phenomena, we can scarcely by such a train of reasoning be said to be advancing towards a clearer conception of the material conditions of a resurrection, inasmuch as there is no analogy between those conditions which such a theory proposes and any well ascertained fact in science. Cicero has well said: "It is easier in philosophy to say what cannot be than what is" and such being the case within the domain of human knowledge, with what additional force does the sentiment apply to the miraculous. The decomposition of the body is a chemical act, and chemistry explains its minutest details. The resurrection of the body is a miracle, and its conditions are as much beyond our sphere of philosophizing, as those which at the marriage feast in Galilee resulted in the change of water, that is oxygen and hydrogen gas, into aleohol, that is oxygen, hydrogen, and earbon, with ænanthic ether, salts of potash, and other matters not originally present.

I scarcely conceive it necessary to do more than remind you that the physiological negative laid on a corporeal resurrection as a necessary part of the balance of nature, (that is as a law of nature,) does not in the least interfere with the doctrine of the soul's immortality. The indestructibility of the thinking mind, of the soul or spirit, has been universally admitted in every age.

Almost at two geographical extremes, the Esquimaux and the Malay, obedient to the custom of their ancestors, leave weapons, food, or sweatmeats in or at the grave. And the benighted children of other lands cherish, according to the particular fancies of their race, a belief in the continued life of the departed; hunting and other manly exercises, or the voluptuous enjoyments of a more sensual elysium being

followed in the spirit land. The great poet of the *Æneid* tells us,

————— “Qua gratia currûm
 Armorumque fuit vivis, quæ cura nitentes
 Pascere equos, eadem sequitur tellure repôstos.”

And the wisest and most noble of the ancient Greeks is thus by Plato represented as expressing himself, almost with his latest breath.

Οὐ πείθω, ἔφη, ὦ ἄνδρες, Κρίτωνα, ὡς ἐγὼ εἰμι οὗτος ὁ Σωκράτης, ὁ νυνὶ διαλεγόμενος καὶ διατάττων ἕκαστον τῶν λεγομένων, ἀλλ' οἴεταί με ἐκείνον εἶναι, ὃν ὄψεται ὀλίγον ὕστερον νεκρόν, καὶ ἐρωτᾷ δὴ, πῶς με θάπτῃ.

Nor need the most argumentative amongst ourselves, distress himself, because he cannot comprehend the nature of this invisible mind. Much less should he on that account doubt its existence. Examine into the physical problem of what is matter! Every school-boy firmly believes in the *reality* of his bat and ball. But the philosopher, (*i.e.* the deep thinker,) fails to see even in the property of *extension* which these toys possess, anything but the index of a force without which they and all other matter, would be destitute of form or of any other sensible property. Thus matter is the noumenon, and in reality force (*i.e.* an active spirit or essence) is the phenomenon. We don't taste, smell, feel, see, or hear matter, but only force, under the form or character of matter. A spirit is simply force, of which our five senses cannot take cognizance.

But time admonishes me to be brief. And in conclusion therefore, I would remark that Physiological Chemistry makes plain a fact regarding which there has been much misconception. I refer to the nature of the identity between the present and the resurrection body. Unquestionably, some of what is ours to-day in the way of corporeal particles, may, for ought we know to the contrary, have belonged to thousands of separate individuals of our species at a former time. And what is now for the moment ours, passes, the next into the general store-house

of nature, whence it will hereafter be reproduced in other forms of life. Of those, therefore, who hold that the particles of any one body laid in the grave are the same identically as those which shall be raised up together, I ask, what is to become of the identity of all the tens or hundreds or thousands or millions, it may be, of other resurrection bodies previously buried, from whose decompositions the atoms of this especial body were during life supplied? "Whose wife shall she be of the seven?" said they who sought to disprove the resurrection in argument with the great Author of it. Your resurrection body atomically the same is a useless, and therefore, a pernicious dogma. But just as continually changing your material particles through life, your identity remains unaltered, so in the resurrection body its new materials will but reproduce your former self, according to the canon or law, alike acceptable to reason and faith, "that which thou sowest, thou sowest not that body which shall be, God giveth it a body as it hath pleased him, and to every seed his own body."

To the question, where does our identity lie? The statement which satisfies most reasonable demands is this; that though the wisest cannot answer the question of *what am I?* or *where do I exist?* and though there is no physical key by which we can unlock the mysteries of mind, yet we can indicate what are its prerogatives. I adopt the language of Isaac Taylor.—"Consciousness of the properties of matter is the prerogative of mind, and so is initiative power. Mind is, moreover, not solid in its constitution, neither is it gaseous, nor has it contour, nor outline, nor colour, nor taste. It takes cognisance of all these things, because they are not of itself. And, moreover, it has this property, that it *thinks itself*, and by this reflective life takes cognisance of its own existence." These points then being primarily admitted; viz., a resurrection for the body, and the immortal and inextinguishable character of the soul or thinking principle in man; it only remains, in arranging the conditions for the preservation of personal identity, to indicate, that as it rests in the *unchangeableness* of

that image which the mind's reflective life takes cognisance of, it matters little what atoms of water, carbon, nitrogen and phosphorus are made its agents, or whence are derived the few pounds of lime employed in erecting even its glorified house. God has full store of these. And from whencesoever they come, if they are employed at all, (and if they are not, why should we prate about the atomic restoration of the then useless debris of a polluted and sin-soiled carcase?) I say, if they are constituents, under any modification or form, of our glorified bodies, it is clear that they need not have been ours before, to ensure that identity to which they cannot contribute and of which the Bible speaks.

To those who press for the atomic sameness of our present and resurrection bodies, as an inference from the unquestionable fact that the raised body of our Saviour was the same in every way (*i.e.*, atomically) as that which was laid in the grave, the answer is; that as the body of Jesus "saw no corruption," chemical forces meddled not with his sacred remains. And, to my mind, it has always been cause of thankfulness, that the miraculous interference in his case with the common laws of dead matter, *has been specially recorded by the pen of unerring inspiration.* For now not only as of faith, but also as of reason, do I know that to other eyes besides those of Thomas, shall it be permitted to witness the corporeal evidence of a ransom finished on the cross.

"Behold," also, says Paul, "I show you a mystery; we shall not all sleep, but we shall all be changed. Here we remark once more a miraculous interference on the part of Deity, for the circumstances are new and demand it. Time is at an end. Eternity has begun. Countless millions of resurrection bodies, and millions of changed ones are crowding to the judgment-seat. The science of earthly forms is altered; for the elements of which they were composed have been dissolved. And from the fair surface of a "new earth" there rises, far up into that "new heaven" with which it is surrounded, a shout of universal homage to the God, whose very

existence puny man has here considered himself competent to deny.

And now, last of all and yet to some not least of all, these resurrection bodies of ours shall not only be glorious in their new creation, but inasmuch as they were not on earth the ministers of our lusts and pleasures, they shall not be the abiding memorials of these unprofitable joys.

“Go down then to corruption, mortal forms,
Into that vale the fallen all descend ;
Go to the hosts that, sheltered from the storm,
Sleep to the end!”

THE END.





